

# ***Interactive comment on “Evidence of horizontal and vertical transport of water in the Southern Hemisphere Tropical Tropopause Layer (TTL) from high-resolution balloon observations” by Sergey M. Khaykin et al.***

**Sergey M. Khaykin et al.**

sergey.khaykin@latmos.ipsl.fr

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Authors' reply to referee #1

We thank the reviewer for the appreciation and supporting review.

All suggested corrections have been implemented, namely:

1. Abstract: Since you quantify the amount of water vapor later for cross-tropopause transport (0.6 ppmv), I recommend to also mention that for in-mixing (0.5 ppmv).

Line 35-36 have been modified to include the mention of enhancement due to in-

mixing: “A signature of in-mixing is inferred from a series of vertical profiles, showing coincident enhancements in water vapour of up to 0.5 ppmv and aerosol at the 425 K (18.5 km) level.”

2. P 1, line 55: You might want to also refer to Riese et al. (2012): Impact of uncertainties in atmospheric mixing on simulated UTLS composition and related radiative effects, JGR, Vol. 117, No. D16305 doi: 10.1029/2012JD017751.

The reference has been added.

3. P 2, line 100: ‘2 Experimental setup and instrumentation’. The section contains also the description of the transport modeling, therefore maybe better: ‘2 Experimental setup, instrumentation and modeling’.

Section 2 was renamed to “Experimental setup, instrumentation and modeling”

4. P 2, lines 112 – 115: ‘ An S-band weather radar of IPMet was continuously operating at the campaign site and provided information on the echo top heights. The IPMet radar has a 2° beam width and a range of 450 km for surveillance, but when operated in volume-scan mode every 7,5 minutes it is limited to 240 km, with a radial resolution of 250 m and 1° in azimuth, recording reflectivities, spectral width and radial velocities at 16 elevations between 0.3° and 45°’. I think from the logic flow the information on the weather radar would be better placed at the beginning of 2.2, when renaming this section to ‘2.2 Remote sensing instruments’. Consequently, I would rename section 2.1 to ‘2.1 Balloon-borne in situ instruments’.

The sections were reorganized and renamed accordingly

5. P 4, lines 202-212: For the reader it would be easier to follow if you mention the colors of the curves shown in Fig. 1 in the text - and also in the caption of the figure. Also in the figure caption: ‘convection’ → ‘convention’.

The description of the curves’ colors has been added to the text and the Fig. 1 caption. The typo in the Fig. 1 (“convection”) caption has been corrected

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6. Figure 4: I think the backscatter SR and RHi should be also shown in the Figure. The information they provide (the SR signal does not point to an ice cloud and the air is strongly subsaturated) is quite important for the interpretation of the observations. Also, I would also like to see the LRT altitude in the figure - as in Fig.1 .

All proposed modifications to Fig. 4 have been implemented. The Fig. 4 caption and the corresponding text (line 377-381) have been modified accordingly.

7. Figure 6, caption: 'The black stars mark the timing of overshooting cells shown in Fig. 6' → Fig. 5. Fig. 6 caption was corrected.

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